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(54) **USER INTERFACE AND FUNCTIONS FOR VIRTUAL REALITY AND AUGMENTED REALITY**

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G06T 19/20	(2011.01)
G06F 40/106	(2020.01)
G06F 40/186	(2020.01)
G06F 3/0481	(2013.01)

(52) **U.S. Cl.**

CPC ***G06T 19/20*** (2013.01); ***G06F 40/106*** (2020.01); ***G06F 40/186*** (2020.01); ***G06T 19/006*** (2013.01); *G06F 3/04815* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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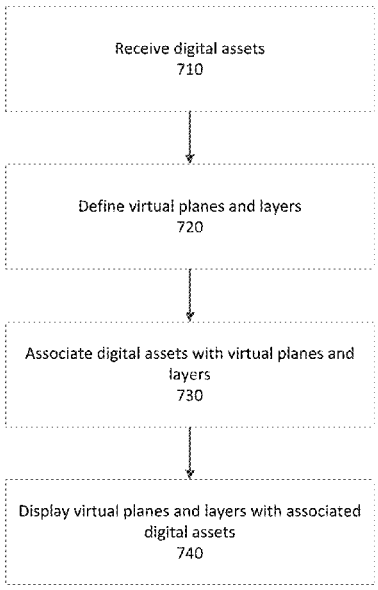
(57) **ABSTRACT**

Systems and methods are described to enable the creation of user interfaces that may adapt to different environments and may be automatically created. User interfaces may be two-dimensional or three-dimensional and may be used in virtual reality or augmented reality applications. An interface creator may create or receive digital assets associated with a content item, define virtual planes and associated digital asset templates, associate the digital assets with the virtual planes, and enable display of the virtual planes with associated digital assets to a user for user interaction. Digital assets may be automatically edited to meet the specifications of the templates associated with the virtual planes. Virtual planes and templates may also be standardized and aggregated so that a completed user interface may be easily delivered and presented with other content items in a uniform manner.

28 Claims, 9 Drawing Sheets



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2014/0098102	A1*	4/2014	Raffle	G06F 3/0482 345/440
2014/0306938	A1	10/2014	Block	
2015/0235408	A1	8/2015	Gross	
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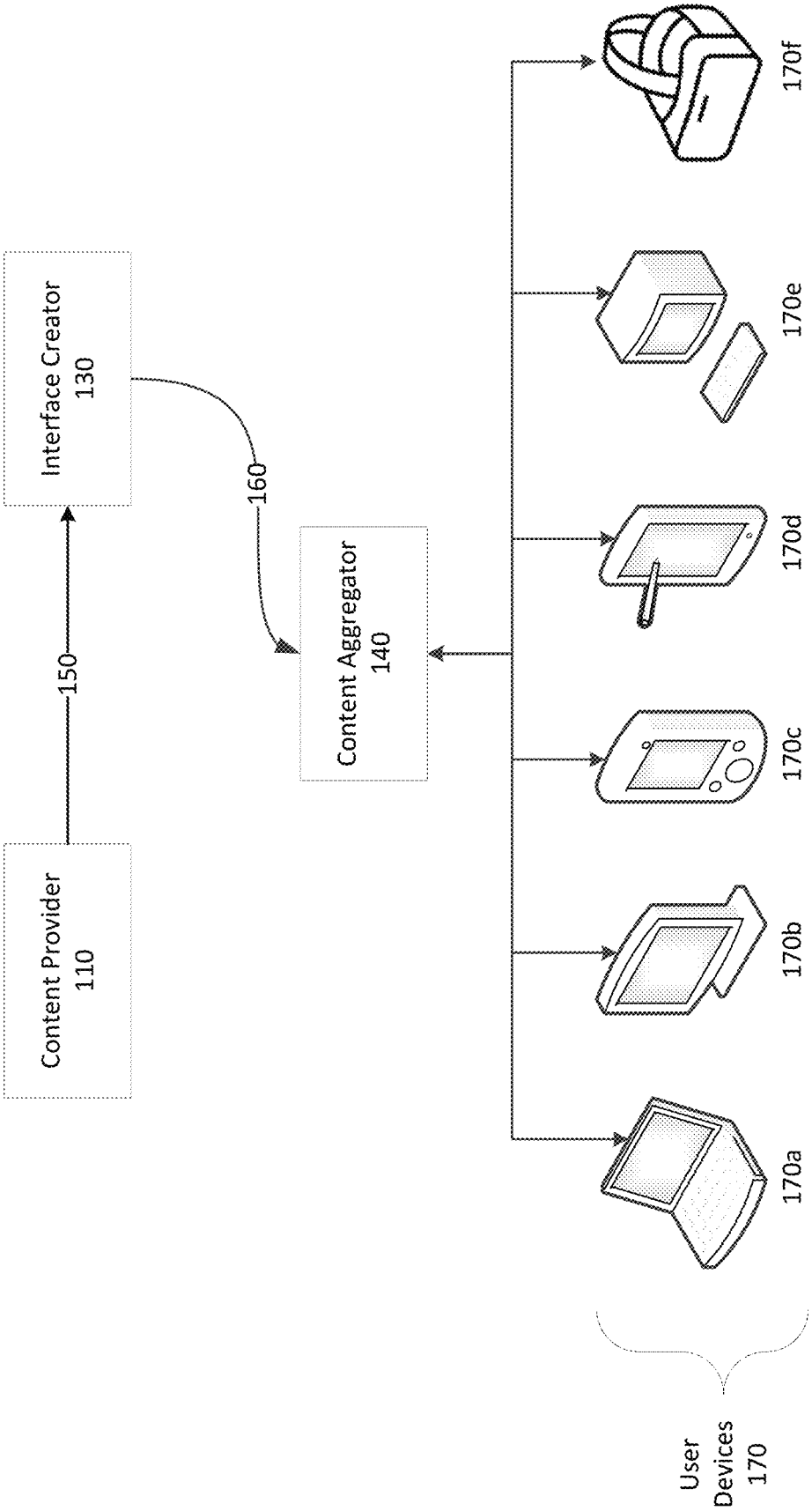
Content Provider
110
150
Interface Creator
130
160
Content Aggregator
140
170a
170b
170c
170d
170e
170f
User
Devices
170

FIG. 1

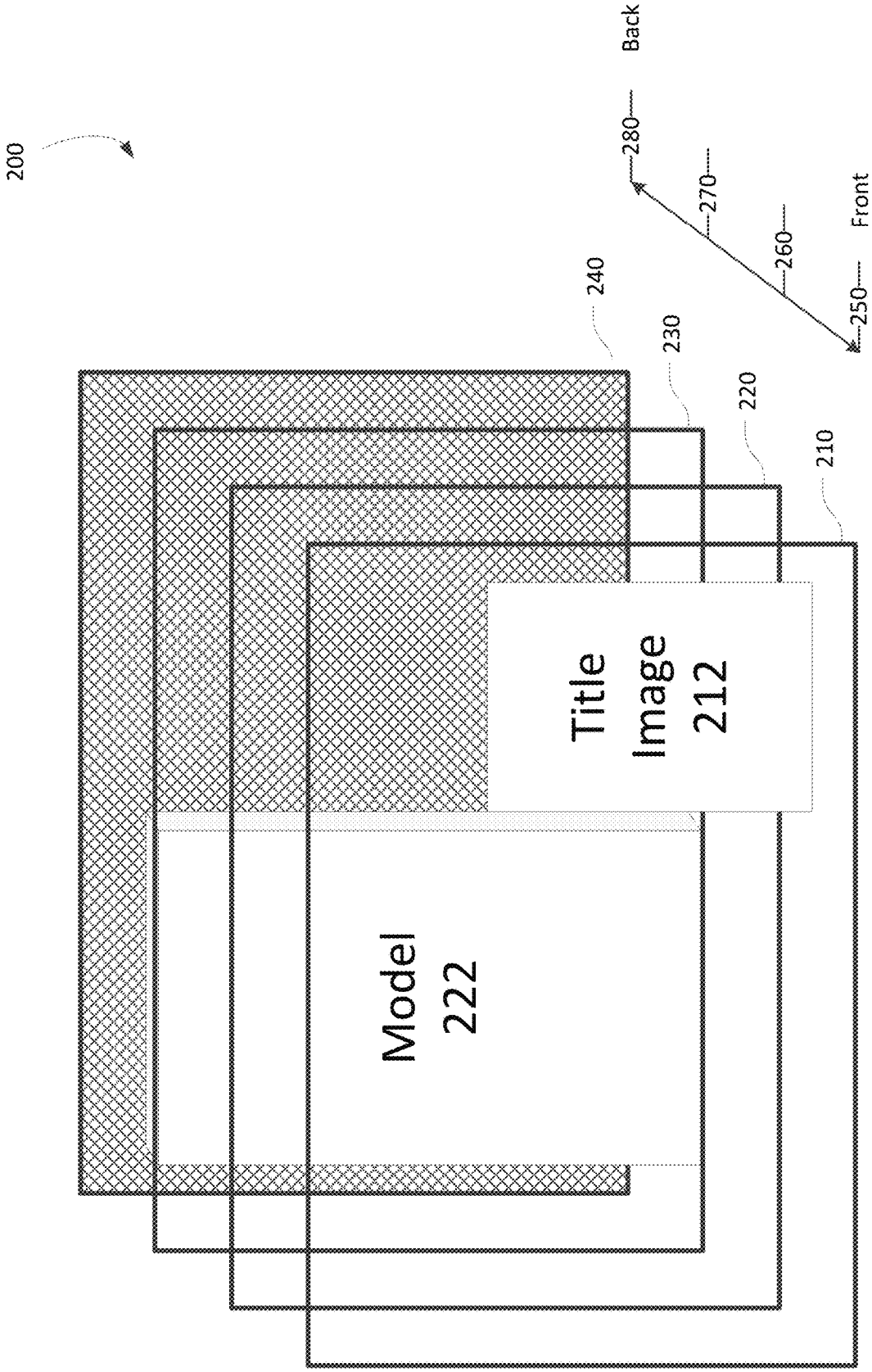
200
Back
280
270
260
250
Front
240
230
220
210
Title Image 212
Model 222

FIG. 2

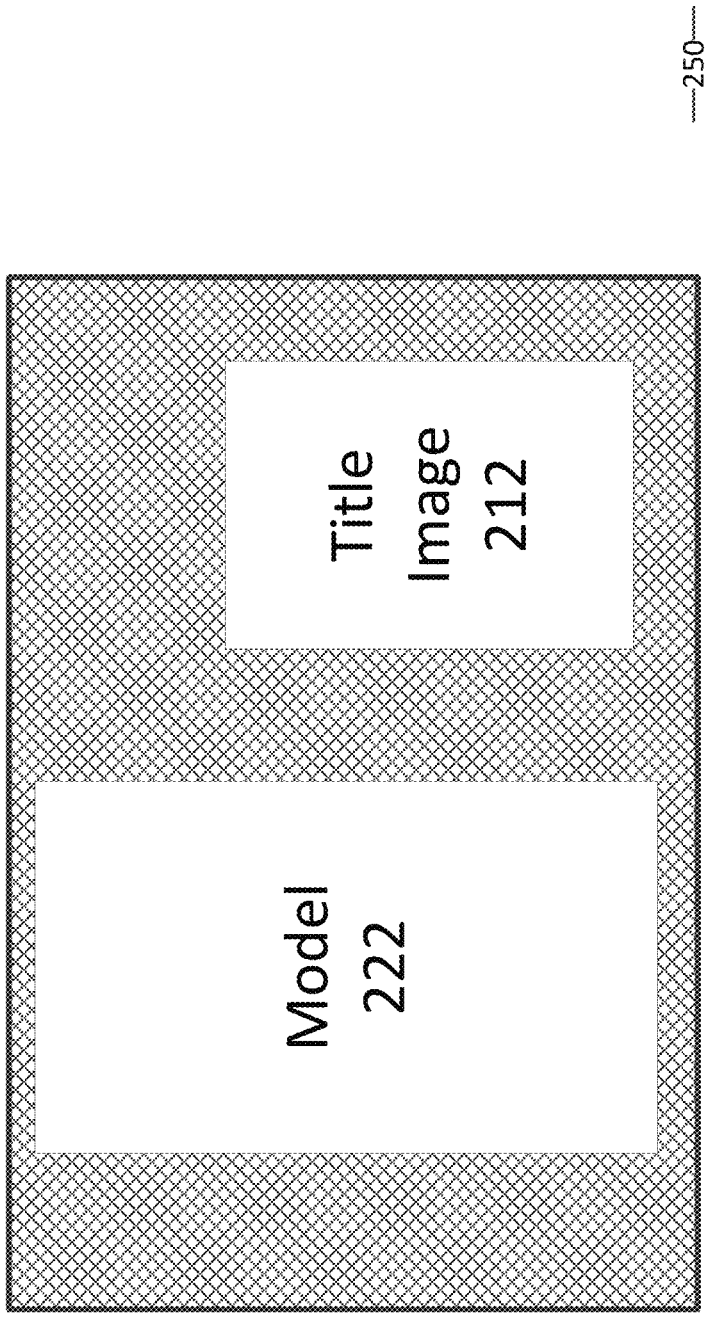

FIG. 3

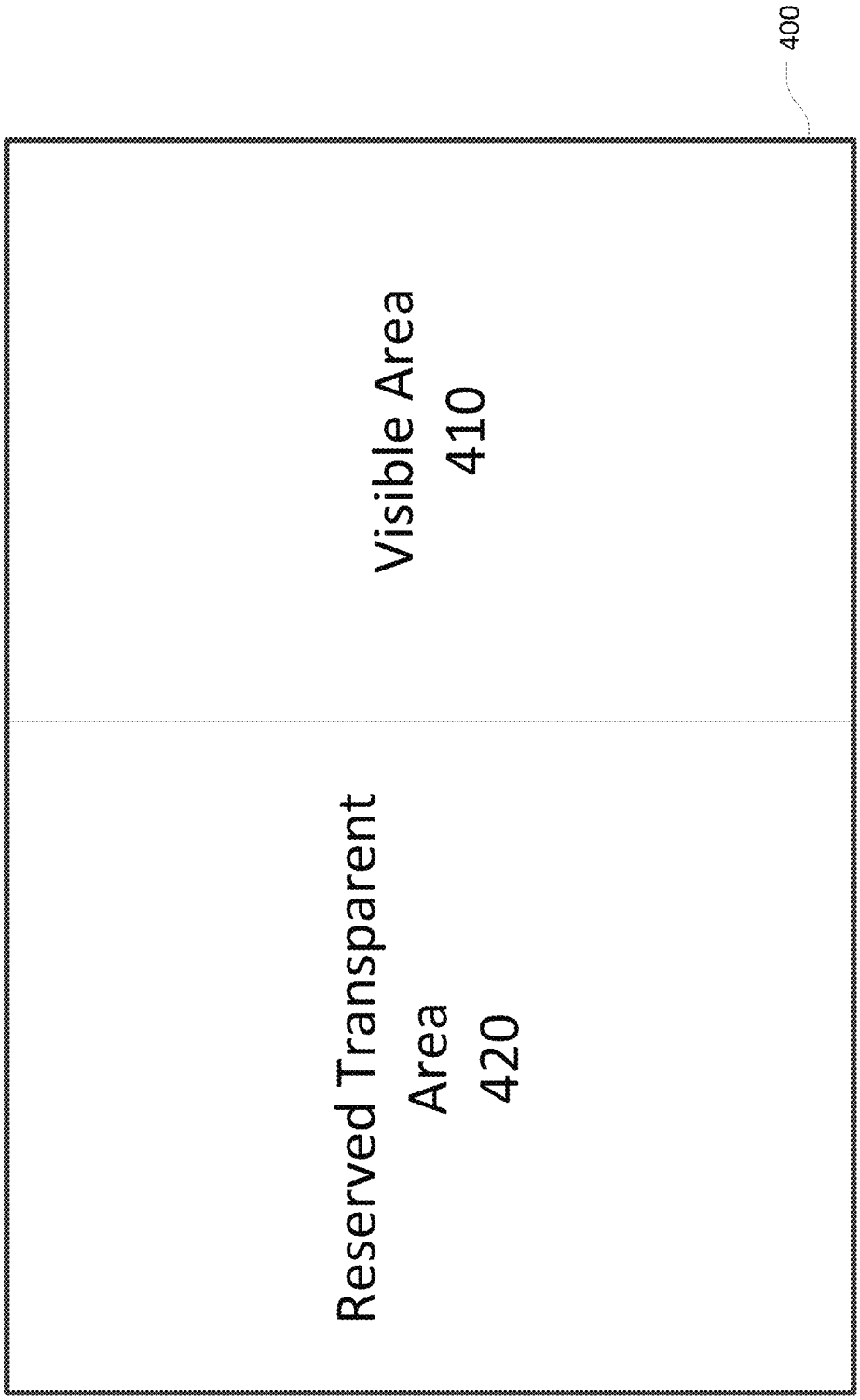

FIG. 4

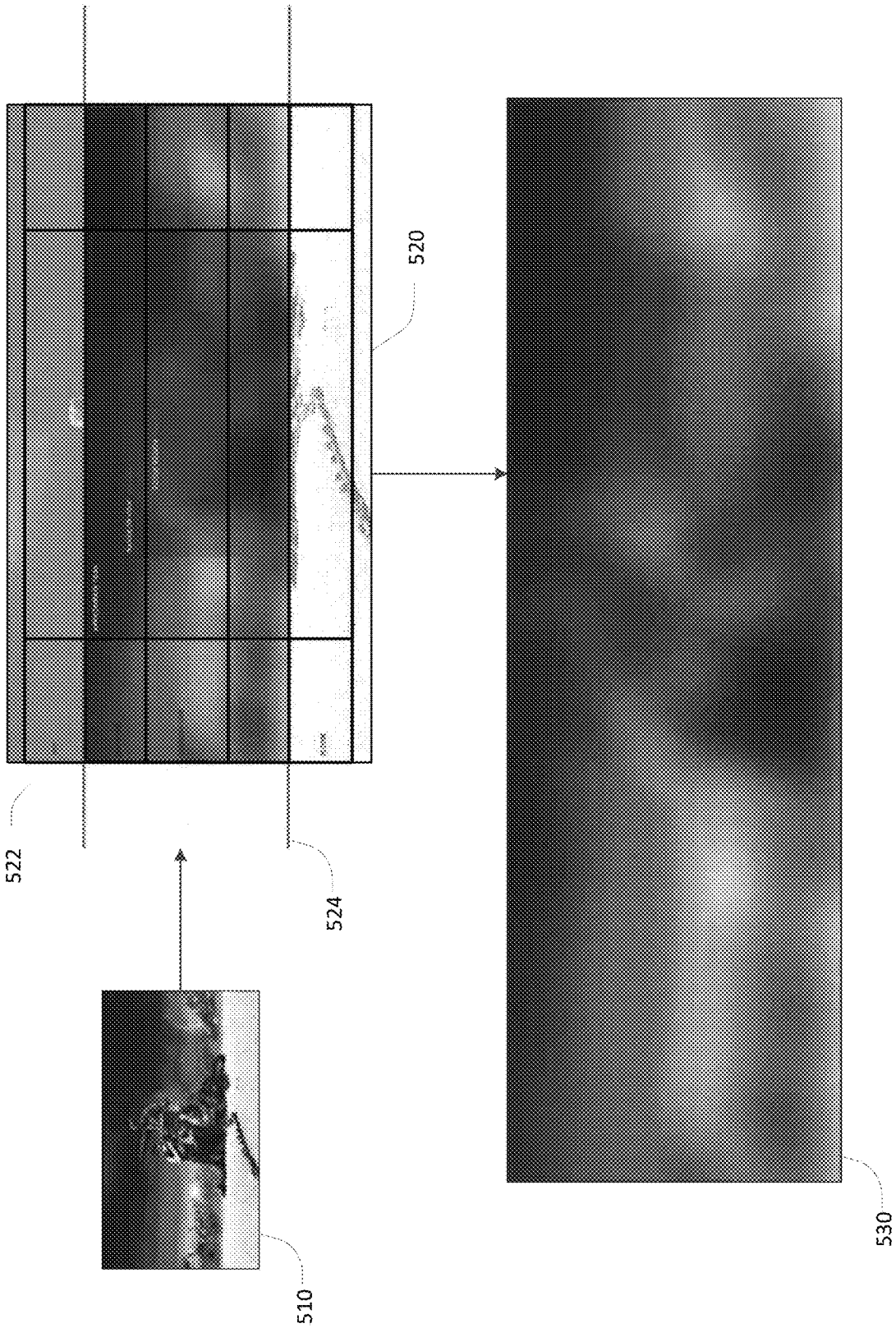

FIG. 5

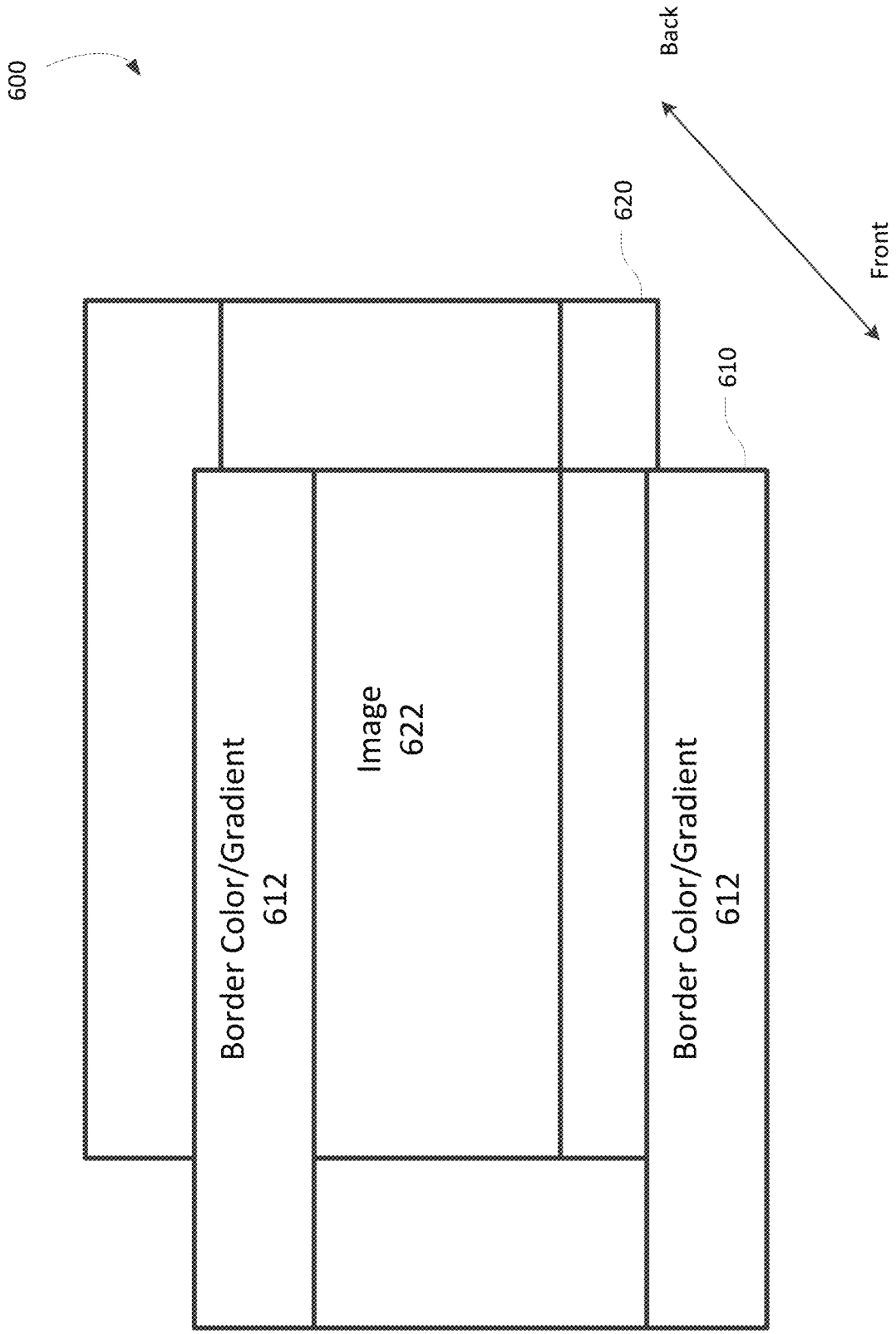
600
Back
Front
620
610
Border Color/Gradient
612
Image
622
Border Color/Gradient
612

FIG. 6

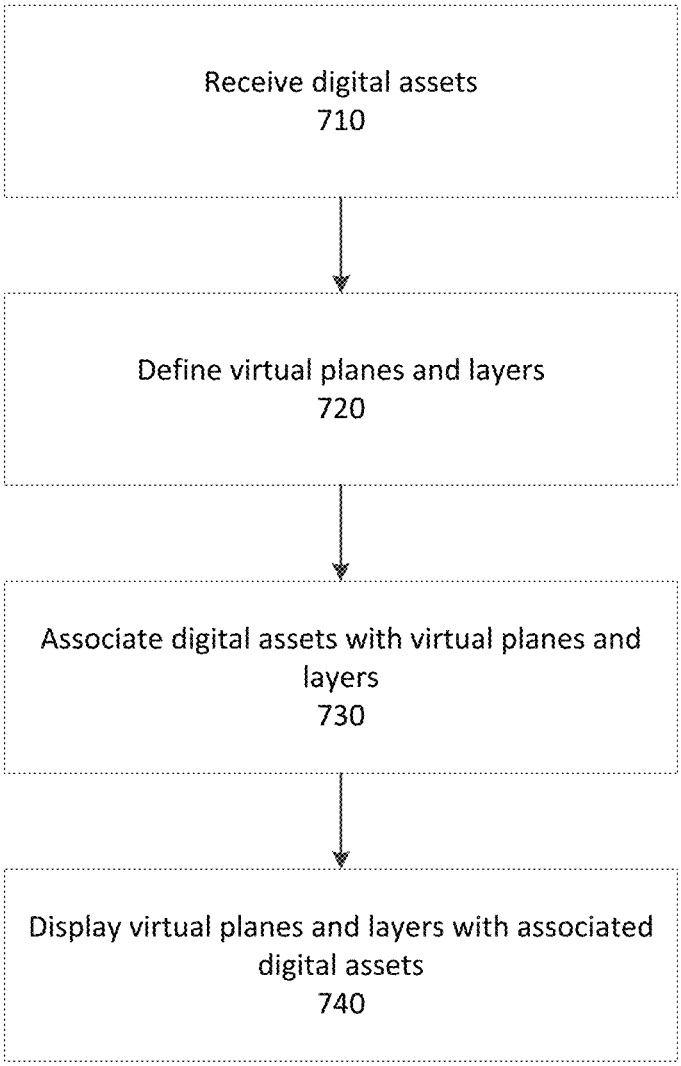
Receive digital assets
710
Define virtual planes and layers
720
Associate digital assets with virtual planes and layers
730
Display virtual planes and layers with associated digital assets
740

FIG. 7

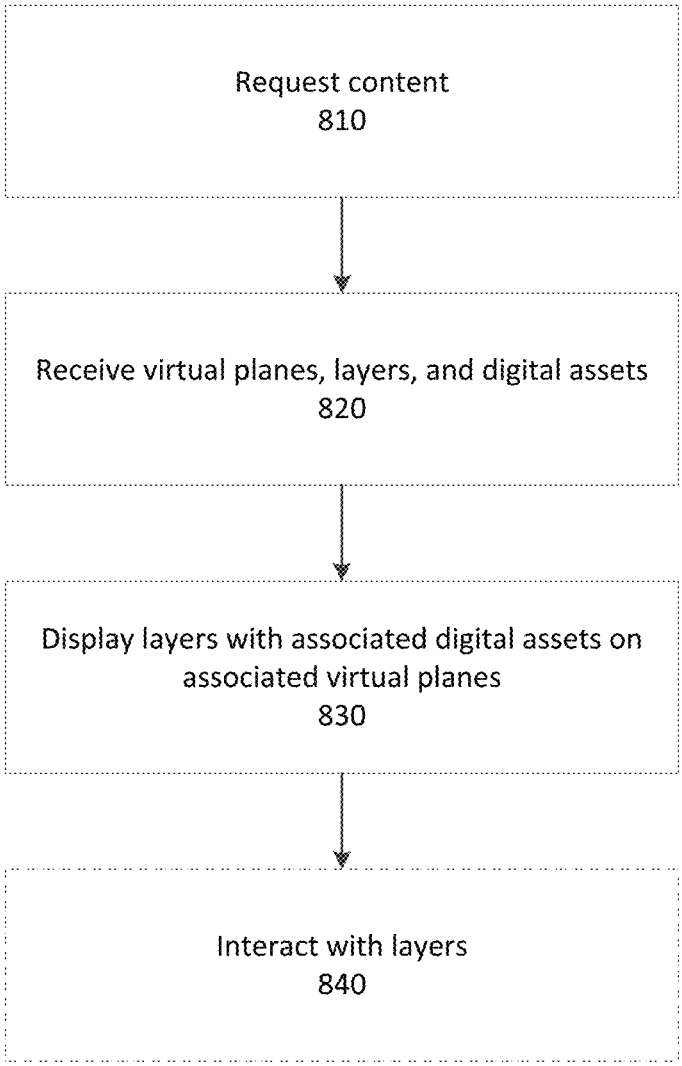
Request content
810
Receive virtual planes, layers, and digital assets
820
Display layers with associated digital assets on associated virtual planes
830
Interact with layers
840

FIG. 8

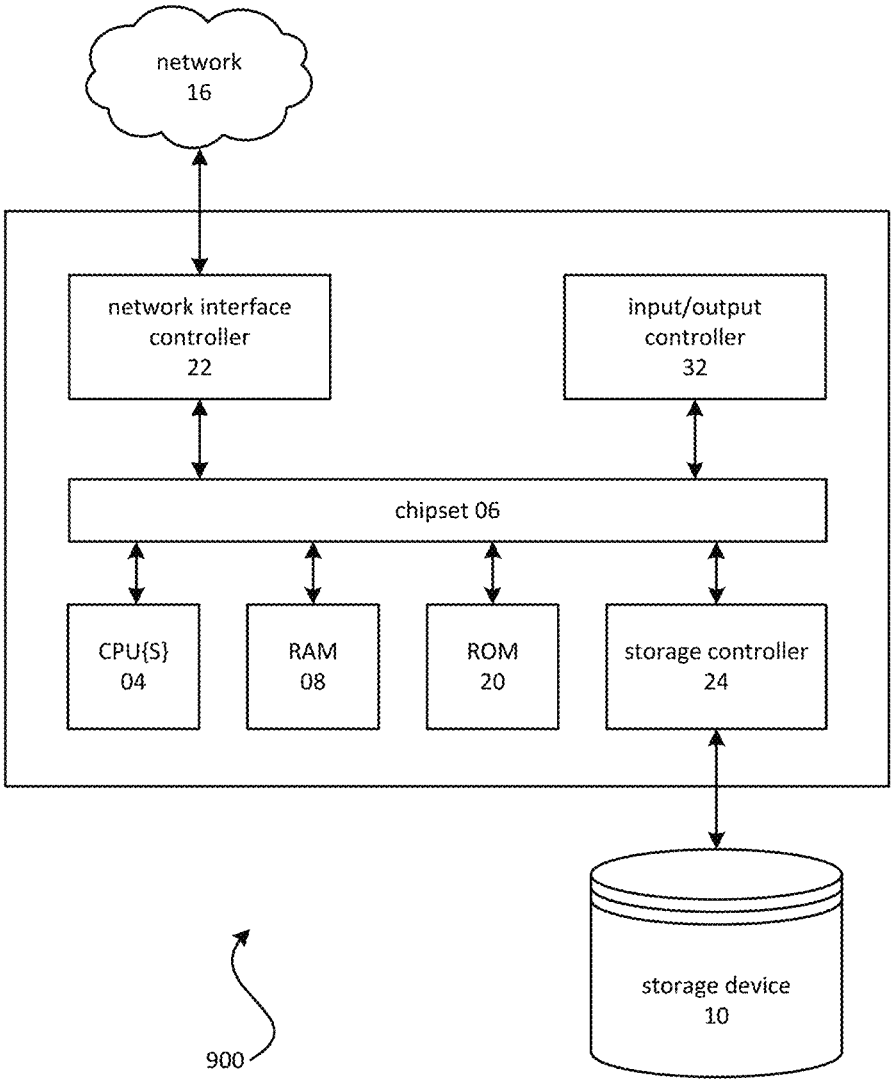
network
16
network interface
controller
22
input/output
controller
32
chipset 06
CPU{S}
04
RAM
08
ROM
20
storage controller
24
storage device
10
900

FIG. 9

USER INTERFACE AND FUNCTIONS FOR VIRTUAL REALITY AND AUGMENTED REALITY

BACKGROUND

User interfaces enable human-computer interaction. A user interface may aggregate content in a generic fashion, such as a TV channel guide, which simply lists available content. Separate interfaces may be created for different types of devices used to access content. Emerging technologies related to virtual reality and augmented reality content present new challenges for constructing, presenting and using interfaces.

SUMMARY

Existing virtual reality and augmented reality user interfaces are custom built for content to which they allow access. Interfaces are needed, for example, for users and creators and others to initiate and navigate content, interact with content, discover what is available in the content and related resources, communicate with other users and entities, etc. Custom building of user interfaces creates additional overhead for a content distributor, which may add extra expenses and delays. For example, if a movie-streaming service requires a virtual reality or augmented reality interface to be created before the service will host a movie, extra work will be needed by the content provider to build a three-dimensional environment and interface for the movie. The extra work adds to the cost associated with the movie and may delay the release of the movie on the streaming service until the interface is completed. Further, the movie may be distributed on services that have both two-dimensional and three-dimensional interfaces, requiring additional interfaces with extra work and possible additional delays.

Systems and methods are described to enable the creation of user interfaces that, in one aspect, may adapt to different environments and may be automatically created. An interface creator may create or receive digital assets associated with a content item, define virtual planes and associated digital asset templates, associate the digital assets with the virtual planes, and enable display of the virtual planes with associated digital assets to the user for user interaction. In another aspect, digital assets may be created to enable them to be automatically edited to meet the specifications of the templates associated with the virtual planes. In yet another aspect, virtual planes and templates may be standardized so that a completed user interface may be easily sent to a content aggregator to present the content item with other content items in a uniform manner.

This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing Summary, as well as the following Detailed Description, is better understood when read in conjunction with the appended drawings. In order to illustrate the present disclosure, various aspects of the disclosure are shown. However, the disclosure is not limited to the specific aspects discussed. In the drawings:

FIG. **1** depicts an example network of entities involved in the creation and display of a user interface;

FIG. **2** illustrates an example 3D user interface;

FIG. **3** illustrates the 3D user interface of FIG. **2** displayed in a 2D environment;

FIG. **4** illustrates an example template of a layer;

FIG. **5** illustrates an example process of enlarging and degrading an image;

FIG. **6** illustrates an example of a border color or gradient being added to a user interface;

FIG. **7** is a flow diagram depicting an example method for creating a user interface;

FIG. **8** is a flow diagram depicting an example process for receiving and displaying a user interface; and

FIG. **9** depicts an example computing system.

DETAILED DESCRIPTION

A myriad of content is consumed on a daily basis. Articles, blogs, and documents are read; television shows and movies are watched; books are both read and heard; video games are played; software is executed. Much of consumed content is consumed via smartphones, laptops, desktops, tablets, game consoles, and other computer systems, typically involving use of the Internet or other computer network.

For a user to consume content on a computer system, the content must have an associated user interface. A user interface allows a user to interact with the content in some way, typically by inputting a command. For example, a user interface for a video streaming service may allow a user to search and navigate a library of videos and then select a video of his or her choosing to watch. Then, during playback, the user may or may not be able to perform various actions such as pause, play, rewind, and fast-forward. Generally, a user interface on a computer system may use any viable method of input compatible with the system, such as pushing buttons on a remote control or game controller, voice commands, touch gestures, body gestures, keyboard or mouse commands, or any other method of human-computer interaction that allows a user to access or manipulate data on the computer system.

Virtual reality (VR) leverages three-dimensional (3D) environments to immerse a user in a virtual world. A 3D virtual computer environment is first created, and users typically don specialized computer eyewear to immerse themselves in the environment. Once immersed in the environment, a user may look around as if he is physically inside it. For example, the user may typically look 360 degrees in every direction to view the environment. In some cases, the user may also walk around the environment by walking in physical reality, which may or may not take place on a treadmill or other contained apparatus a user may move in or on. Augmented reality (AR) is similar in concept to virtual reality in that it involves virtual objects projected to a user's visual field; however, these virtual objects are projected into the user's current real physical environment. For example, a user may hold up his mobile phone camera view and see a 3D virtual object added to the screen image, such as a rendering of a completed building at a construction site. In another example, a user may wear specialized computer eyewear that adds virtual projections to the physical environment, such as a news channel being broadcast on a wall as if a television was present, or video game characters on a user's coffee table that the user may manipulate.

User interfaces for VR and AR typically allow interactions via body gestures, voice commands, and button com-

mands, which may be available via controllers, microphones, environmental sensors, or any other viable input apparatuses. For example, a user may physically move his head in a specific direction to view a virtual object or scroll through a list of virtual objects; a similar action may be performed by one or more joysticks or directional-pads on a controller or headset. To select such a virtual object, a user may speak "select" or another command that indicates to the computer system that the user would like to select the object, or the user may press a button on a remote control, the VR or AR headset, or other controller to select a desired object.

Systems and methods are described enabling the creation of user interfaces that may be automatically created and may adapt to different computer environments. An interface creator may receive digital assets associated with a content item, define virtual planes and associated digital asset templates for displaying digital assets, associate the digital assets with the virtual planes, and display, or output for display, the virtual planes with associated digital assets to the user for user interaction. Digital assets may be automatically edited to meet the specifications of the templates associated with the virtual planes. Virtual planes and templates may be standardized so that a completed user interface may be easily sent to a content aggregator to present the content item with other content items in a uniform manner.

FIG. **1** illustrates an example system using embodiments described herein. The example entities of FIG. **1** may be part of or use a computer network, which may be a small, home network or part of a large network such as the Internet, or a combination of both. Alternatively, the entities of FIG. **1** may be part of a single computer system.

The content provider **110** may be used by a provider of consumable content, such as a media company or other source of content requiring a user interface. For example, the content provider **110** may be used by a TV or movie studio, a video game company, a software developer, or even a single user. The content provider **110** is communicatively connected to an interface creator **130** via connection **150**, as shown in FIG. **1**. The content provider **110** transmits digital assets to the interface creator **130**. Digital assets may be entities the user of the content provider **110** wishes to include in a user interface associated with its content item. For example, a digital asset may be an image from the content item, a three-dimensional (3D) virtual object associated with the content item, a snippet of the content item's video, etc.

The interface creator **130** receives digital assets and uses them to create automatically, or to help a user create, one or more user interfaces to be associated with content provided by the content provider **110**. The interface creator **130** may create two-dimensional (2D) or 3D interfaces for use with a variety of devices, such as the user devices **170**. A method for user interface creation is described in more detail below. After the interface creator **130** creates the user interfaces based on the received digital assets, it sends the interfaces to a content aggregator **140** via connection **160** to be consumed by users, as shown in FIG. **1**.

The content aggregator **140** may be a user-facing provider of media services, such as software used by a cable company or streaming service, which may aggregate content from several sources into a single source point for a customer. The content aggregator **140** may deliver content via a set top box, the Internet, a local hard drive, or any other viable method of delivering content to a user. As shown in FIG. **1**, a user may access content via a laptop **170***a*, a television **170***b*, a smartphone **170***c*, a tablet **170***d*, a desktop **170***e*, a VR headset **170***f*, or any other device capable of presenting content to a user. The content aggregator **140** presents user interfaces to enable users to access the content to which it providers. The interfaces may be viewed by scrolling, zooming, or any other interaction mechanism that allows a user to view the content items of the content aggregator **140**.

The content provider **110**, the interface creator **140**, and the content aggregator **140** may be physical or digital and take any suitable form for their described purposes. For example, they may take the form of software components on one or more computers or modules within a single software suite. The connections **150** and **160** may be physical connections, such as those via hardware circuits or LAN cables, wireless connections, such as those via WiFi or cellular, or any other suitable communicative connection. In an example, the content provider **110** is used by a media company that creates digital assets relating to a media product, such as a digital 3D spaceship that corresponds to a spaceship in a TV show. The content provider **110** sends a digital representation of that spaceship to an interface creator **130** via the connection **150**. In an example, the digital representation of the 3D spaceship may be sent via email, and the connection **150** may be an Internet connection. The interface creator **130** receives the 3D spaceship and may create a user interface featuring the 3D spaceship, which it then sends to the content aggregator **140**. The created interface may be stored in a digital file and sent via email through the connection **160** to the content aggregator **140**; the connection **160** may also be an Internet connection. The content aggregator **140** receives the created user interface and may store it for display, or output for display, to users accessing the content aggregator **140** and attempting to access the TV show or information about the TV show.

In another example, the content provider **110**, the interface creator **140**, and the content aggregator **140** may be software programs or software modules on a single computer. A user of this computer may create content with or open content with the content provider **110**. Such content may be a home movie, a video game, or other content that may require a user interface. The user may use the content provider **110** to create digital assets for use in the user interface. The user may then send the digital assets to an interface creator **130** to create a user interface using the digital assets. In this example, the connection **150** may be a hardware circuit on the computer, such as a bus. After the interface is created, it may be joined via connection **160** with the user-created content in a content aggregator **140**, which the user may then access from the computer or other device capable of accessing the content; the connection **160** may also be a hardware circuit on the computer.

An interface creator **130** may receive one or more digital assets and may automatically create one or more user interfaces using the digital assets. The interface may be manually altered after creation. A user interface may be 2D or 3D and may have the ability to dynamically adapt dimensions to a user device accessing the user interface. For example, a user interface may be created for use in a 3D VR environment, but may be viewed as a 2D interface from a smartphone, TV, or computer. The digital assets the interface creator **130** receives may be interactive and may allow the user to select or manipulate them. For example, a user may select an image to begin playback of a movie or select a 3D computer model to view.

A user interface may comprise one or more layers. Layers may comprise or contain one or more digital assets, may be of any geometrical shape, and may be situated on various virtual planes in a 3D environment. A virtual plane of a user interface is a defined area with a depth attribute used to

create depth of field for a user experiencing the user interface in 3D. For example, a virtual plane in a 3D environment may be defined as "all coordinates with a perceived depth of two feet away from the user," which would comprise a sphere of coordinates. When viewing a 3D user interface in a 2D environment, layers may be flattened so that they appear to be on a single virtual plane. Some 2D environments may retain one or more properties of multiple virtual planes, such as a parallax effect when scrolling or moving a device.

FIG. **2** illustrates an example 3D environment **200** comprising the layers **210**, **220**, **230**, and **240** situated on the virtual planes **250**, **260**, **270**, and **280**, respectively. The layer **210** may comprise a transparent background and may contain a digital asset, such as, for example, the Title Image **212**. The title image **212** may be cover art or a poster for a movie or TV show, which identifies the associated content to a user. The layer **220** may comprise a transparent background and may not currently contain any digital assets, but may contain digital assets received at a future time. The layer **230** may also comprise a transparent background and contain a digital asset, such as the Model **222**. The model **222** may be a 3D computer model associated with the content for which the user interface is intended to be used, such as the 3D spaceship example described above. The layer **240** may contain a background pattern to accent the user interface.

To create a user interface for a content item, the interface creator **130** may receive one or more digital assets associated with that content item from the content provider **110** supplying the content item. The digital assets may have associated metadata that allows the interface creator **130** to automatically determine where the digital assets should be placed in the interface. For example, the content provider **110** may send a title image, such as the title image **212**, having metadata that allows the interface creator **130** to determine the title image should be located closest to the user in the user interface; this process may be as simple as sending an email with the digital asset and the word "title" or "front," using XML tags, or using any other viable method of associating metadata with a digital asset. The interface creator **130** may also have an Application Programming Interface (API) that a content provider **110** may use to send digital assets and group or classify the digital assets into sections of the desired user interface. For example, a method of the API may allow the content provider **110** to place the title image **212** in the front of the user interface without sending metadata with the title image **212**. In an example, the interface creator **130** may operate in accordance with a known configuration, as described below, and digital assets may include metadata from the content provider **110** to indicate where they should be placed in the configuration.

The interface creator **130** may already have access to digital assets of a content item from previous transactions or interfaces. For example, a user interface or an advertisement may have been created previously for a content item available via the content aggregator **140**, and digital assets from that previous work may be available to the interface creator **130**. Again, such digital assets may use associated metadata, an API, or user intervention to place them in a position in a user interface.

Further, the interface creator **130** may have generic digital assets that may be used on any user interface, such as ambient effects or stock images and environments. For example, a content provider **110** may wish to include ambient effects in a user interface, such as fog, fire, weather, etc. These effects may be available for selection from the interface creator **130**. A content provider may also wish to populate a 3D environment with a generic image or environment, such as one in space, on a mountaintop, in the desert, or simply a background pattern, such as that shown in FIG. **2** and FIG. **3**, described below.

The interface creator **130** may also leverage interactive digital assets. For example, a user interface connected to a network such as the Internet may include one or more social media feeds containing recent posts about the associated content item. In an example, the user interface may also include one or more interactive elements that allow a user to direct the content item, such as a "choose your own adventure" feature that may change the outcome of a story, a feature that allows a user to interact with story protagonists, or any other feature allowing user manipulation of a content item.

The interface creator **130** may define virtual planes based on a default configuration scheme, the number of digital assets it receives, or a user-defined scheme. For example, if the interface creator **130** receives two digital assets, such as a title image **212** and a model **222**, the interface creator **130** may define two virtual planes, such as the virtual planes **250** and **270**, to create depth in the user interface. Alternatively, the interface creator **130** may define any number of virtual planes based on a default configuration scheme regardless of the number of digital assets received, such as defining the four virtual planes **250**, **260**, **270**, and **280**, as shown in FIG. **2**, even though they may lack digital assets. A content provider **110** or user may also define virtual planes manually.

Each virtual plane may contain a layer, which may comprise or contain digital assets. A layer may take the form of any geometrical shape and may contain any number of digital assets. For example, the layer **210** in FIG. **2** is rectangular, shown by its outline, and contains the title image **212**. The layers **220**, **230**, and **240** are also rectangular; the layer **230** contains the model **222**, and the layer **240** contains a background pattern. If displayed in a 2D environment, the layers **210**, **220**, **230**, and **240** may be shown flattened into a single layer **210**, where the single layer **210** may contain the title image **212**, the model **222**, and the background pattern of the layer **240**, as shown in FIG. **3**.

FIG. **3** illustrates an example front view of the layers **210**, **220**, **230**, and **240**, displaying the title image **212** and the model **222**. In a 2D environment, this user interface may appear to comprise a single layer on virtual plane **250**, as it does in FIG. **3**, even though the digital assets **212** and **222** are contained on separate layers **210** and **220**, respectively. However, the user interface may retain some perceived depth. The model **222** appears smaller in FIG. **3** than it does in FIG. **2** because of the difference in depth between the virtual planes **250** and **270**. The user interface may also have a parallax effect when tilting or scrolling a user device the interface is displayed, or output for display, on, making the interface appear to have depth from the virtual planes **250** and **270**. In a 3D environment, a user may be able to zoom in on or around the title image **212** or model **222** and freely traverse the environment **200** to view and interact with the user interface.

As with virtual planes, each layer may be defined based on a default configuration scheme, the number of digital assets the interface creator **130** receives, or may be user created. Layers may also be defined by the virtual planes that will contain them. For example, there are four virtual planes in FIG. **2**, the virtual planes **250**, **260**, **270**, and **280**, and each has a respective layer, illustrated by the layers **210**, **220**, **230**, and **240**.

Each layer or virtual plane may have an associated template. The template may determine how digital assets are displayed, or output for display. For example, a template may require a digital asset to be a certain size or may only show a certain area of the digital asset that falls within the template if the digital asset is too large. Alternatively, the interface creator **130** may automatically crop or resize a digital asset, or a user of the interface creator **130** may crop or resize a digital asset, to fit a template. The interface creator **130** may make its templates available to a content provider **110** to ensure that the content provider **110** may supply the interface creator **130** with digital assets that fit the templates if a user of the content provider **110** so desires. Alternatively, the content provider **110** may create the templates, and other portions of the interface, together with the digital assets.

An example template may be seen in FIG. **4**. The template **400** shows the visible area **410** of a layer it is associated with, which may be a layer such as the layer **210** of FIG. **2**. The layer bounds are the outer rectangle, and the template shows that the left side of the layer is a reserved transparent area **420**, and the right side of the layer is a visible area **410** where a digital asset may be viewed. If a digital asset extends beyond the visible area **410**, it may be automatically, or manually, cropped or resized to fit within the visible area **410**. Alternatively, the template **400** may be associated with a virtual plane, such as virtual plane **250**, and obviate the need for a layer to be defined. In such a case, the template **400** would define the rectangular shape shown in FIG. **4**, as well as the visible area **410** and the reserved transparent area **420**.

A template may comprise one or more bounds for a size of a digital asset, which may require editing the digital asset to fit within the one or more bounds. For example, a digital asset may be enlarged and/or cropped to fit within the one or more bounds. In an example, if the interface creator **130** receives small images or is using older images, it may enlarge them to match a standard user interface design. An enlarged digital asset, such as an image, may keep its dimensional ratios, such as width-height-depth ratios, and may not fit inside the area defined by the template. In such a case, the enlarged digital asset may be sized to fit one or more dimensions of the template and may be cropped in accordance with the template. For example, if a template has a 16×9 width-height ratio and the supplied image is small and has a 4×3 width-height ratio, the enlarged 4×3 image will not fit the exact 16×9 ratio of the template. So, the 4×3 image may be resized to match the height or the width of the template, or the image may be resized to be larger than both dimensions. The image may then be cropped in accordance with the template, which may indicate cropping of the image to fit the outer dimensions of the template or may indicate cropping within smaller dimensions of the template, as shown in the example template and cropping of enlarged image **520** in FIG. **5**, below. If the image is resized to match the height of the template, there will be extra width on the template that needs to be accounted for. If the image is resized to fit the width of the template, the image height will be larger than that of the template, necessitating a crop from the top and or bottom of the enlarged image.

Enlarging a digital asset may distort it if it does not have adequate pixel or polygon density. Distortion may result in a poor user experience. Such distortion may be determined automatically via any feasible method, such as sampling portions of the image or comparing the original dimensions of the digital asset to the new dimensions of the digital asset. To account for distortion, the interface creator **130** may apply degrading techniques to the digital asset, such as blurring, adding border colors or gradients, or any other technique that may disguise distortion from a user. For example, an enlarged image may become pixelated and cropped to an extent that a user may see only large boxes of color and vague outlines of the subjects of the image. In response to such distortion, the interface creator **130** may apply a blurring, such as a Gaussian blur, to the image to smooth the pixel edges and create an impression of the original image and its color. Degrading techniques may be automatically determined by the interface creator and may be attributes of a template. For example, a template may comprise one or more attributes indicating that degrading, such as blurring, should occur between specified dimensions of a digital asset.

FIG. **5** illustrates an example process of enlarging and degrading an image. In the example process of FIG. **5**, an original image **510** is being enlarged for use in a user interface. The original image **510** may be used as any type of digital asset in the user interface, as described herein. As shown in FIG. **5**, the original image **510** may be small; specifically, the original image **510** may be too small for use in the user interface. So, the original image **510** may be enlarged to create an enlarged image **520** for use in the user interface. The original image **510** may be enlarged to fit a template, such as the template **522** indicated by the lines superimposed on the enlarged image **520**. Such a template **522** may be any suitable template for use in creating a user interface and should not be construed as limiting. In this example, the template **522** indicates a desired size of the enlarged image **520** by indicating a maximum width and height of the enlarged image **520** and also indicating cropping lines **524**, indicated as lines extending from the template **522**. The original image **510** may be automatically enlarged to fit a dimension of the template **522**. In the example shown in FIG. **5**, the original image **510** was enlarged to fit the width of the template **522**, resulting in the height of the enlarged image **520** extending beyond the template **522**. The original image **510** may not have adequate pixel density to remain usable when enlarged. So, the enlarged image **520** may be distorted. Distortion may be determined automatically, as described above. To account for such distortion, an interface creator, such as the interface creator **130**, may automatically apply degrading techniques to the enlarged image **520**, which may or may not be determined by attributes of the template **522**. As shown in FIG. **5**, a blur was applied to the enlarged image **520** between the cropping lines **524** of the template **522**. After the degrading techniques have been applied, the enlarged image **520** may be automatically cropped, as indicated by cropping lines **524** of the template **522**. The final image **530** may now be usable by the user interface. While the final image **530** may not convey all of the information of the original image **510**, the final image **530** may convey an impression of the original image **510**.

Border colors or gradients may be used to disguise digital asset seams and distortion. For example, a user interface may use a solid color or pattern as a background, which may expand or contract depending on the type of device a user is employing, such as a background of stars in space, and a non-black or non-space image may be placed on this background. The edges of the image may create distinct seams, such as a rectangle, with the background in an undesirable manner. To combat this effect, a gradient effect may be used around the edges of the image to create a gentler transition from the image to the background and may also serve to cover distortion in the image. For example, for a colorful

rectangular image on a black background, a rectangular gradient transitioning the colors of the image to black may be used to cover the top seam to unify the image with the background. A similar gradient may be used on the bottom seam, the side seams, or in any pattern that blends the image into the background. While slightly less of the image may be shown, the image will appear seamless with the background and enhance user immersion.

FIG. **6** illustrates an example of a border color or gradient **612** for an image **622** being added to a user interface **600**. For example, the border color or gradient **612** may be used to disguise portions of an image or better transition the edges of the image to a background. In FIG. **6**, layer **620** contains an image **622**. The image **622** may be any suitable image for the user interface **600**, as described herein. For example, the image **622** may have been a smaller image that was expanded to cover more area of a user interface and did not have adequate pixel density to be expanded to the size of the layer **620**, such as the final image **530** of FIG. **5**. In another example, the image **622** may be a foreground element, as described below.

The image **622** may not blend in with a background color of the user interface **600** and may pull a user out of an immersive experience of the user interface **600**. Because of this, a layer **610** may be created with one or more border colors or gradients **612** to help blend the image **622** with the background. In alternative embodiments, the layer **620** may be directly populated with the one or more border colors or gradients **612**, and the layer **610** may not need to be created. Such a border color or gradient **612** may be a color of a background of the user interface **600**. For example, if the background color is black, both border colors **612** may be solid black. In another example with a black background color, both gradients **612** may transition from transparent to black. If a background image is used, the color of the background image of the user interface **600** may be automatically determined by an interface creator, such as the interface creator **130**, to determine what color or colors the border color or gradient **612** should include. Any feasible method of determining color may be used, such as sampling pixels of an image. In an example, if an image of outer space is used as a background image, the interface creator may determine the background color to be black. Thus, the interface creator may create a black border color **612** or may create a gradient from transparent to black to use as the gradient **612** for the top and bottom of the image **622**. A color of the edges of the image **622** may also be automatically determined to create a gradient from the color of the digital asset to the color of the background image. In an example, if the image **622** has a desert on the bottom of the image **622** and a sky on the top of the image **622**, the interface creator may determine the bottom edge of the image to be yellow and the top of the image to be blue. Assuming the same outer space background, the interface creator may create a gradient from yellow to black for the bottom gradient **612** and a gradient from blue to black for the top gradient **612**.

The bounds of the border color or gradient **612** should match the edges of the image **622**, meaning that if the border color or gradient **612** was placed on the same layer (layer **620**) as the image **622**, the edges of the border color or gradient **612** may line up with or slightly overlap the edges of the image **622**. The layer **610** may be placed in front of the layer **620** so that the border color or gradient **612** appears to cover or line up with the edges of the image **622**. Such a placement may better transition the image **622** to a background of the user interface **600** from the perspective of a user.

Virtual planes, layers, and templates may be defined to serve specific purposes in a user interface. For example, a content aggregator **140** may use a standardized user interface configuration so that it may present content items to consumers in a uniform manner. In an example, each user interface may have a user-interface (UI) layer, a title layer, a foreground element layer, and a panorama layer. Using a standardized configuration of virtual planes, layers, and templates allows an interface creator **130** to provide content providers **110** with templates to shape and size digital assets to minimize edits performed by the interface creator **130**.

The UI layer is the layer closest to the user and may contain a digital asset associated with the content item that easily identifies the content item, such as a movie poster. The UI layer may include controls for the user to interact with the content item, such as a play button for a movie, an episode selection mechanism for a TV show, a search field, or any other element allowing user manipulation. The digital assets of the UI layers of user interfaces collected at the content aggregator **140** may be used in a selection interface of the content aggregator **140** to allow a user to quickly view available content items, such as a scrolling grid of selectable movie posters when using a movie streaming service. In such a selection interface, user selection of a digital asset may send the user to the user interface created by the interface creator **130** for the content item the digital asset is associated with. An example UI layer may be the layer **210** of FIG. **2**.

The title layer lies on a virtual plane behind that of the UI layer and may contain a digital asset identifying the content item, such as a logo or simply text. If no digital asset is supplied for the title layer, text describing the content item may be automatically generated for this layer, such as the name of the content item, movie title, game name, or other identifying name. Because the title layer is behind the UI layer, templates for these layers may be situated so that both the UI layer and the title layer are visible to a user. In an example, the UI layer may use a template such as the template **400** and may have a reserved transparent area on the left side of the layer, such as reserved transparent area **420**. An example title layer may be the layer **220** of FIG. **2**.

The foreground element layer lies on a virtual plane behind the title layer and may contain a digital asset that is meant to be a main point of interest in the user interface and highlight information about the content item to the user; this digital asset is referred to as a "foreground element." In an example, a foreground element for a movie may be larger and more prominent than the digital assets in the UI layer and title layer and may display characters or an action event in the movie. The foreground element layer may also house any 3D models, such as the model **222**, or other prominent digital assets received by the interface creator **130**. An example foreground element layer may be the layer **230** of FIG. **2**.

The panorama layer lies on a virtual plane behind the UI layer, the title layer, and the foreground element layer and may be the back-most layer of the user interface. The panorama layer may contain a digital asset to create a background for the user interface, such as a panorama. For example, in a 3D environment, the panorama layer may contain an image of space to create an immersive space experience for the user. In an example, the panorama layer may contain an image that has been edited in accordance with one or more of the editing methods described above,

such as enlarging, cropping, blurring, adding one or more gradients, etc., to create a seamless background for the user interface. The background image or pattern may be a panorama in that it provides a user with a wide angle or 360 degree view of the subject of the image or pattern and may surround the user. An example panorama layer may be the layer **240** of FIG. **2**.

By using a standardized configuration such as a UI layer, a title layer, a foreground element layer, and a panorama layer, an interface creator **130** may be able to publish its configuration to a content provider **110** for ease of use. For example, with the described configuration, a content provider **110** may be used to create a digital asset for each layer and meet each layer's template requirements. The content provider **110** may then send these digital assets to the interface creator **130** for automated creation of a user interface.

FIG. **7** is a flow diagram depicting an example process for creating a user interface with the interface creator **130**. Although FIG. **7** is depicted as a sequence of blocks, the depicted sequence should not be construed as limiting the scope of the present disclosure. In various cases, aspects, and embodiments, the blocks and described operations may be altered, omitted, reordered, or performed in parallel. For purposes of illustration, reference is made to the network described in connection with FIG. **1**, although any suitable network and systems may be used to implement the described processing.

At block **710**, the interface creator **130** may receive digital assets associated with a content item. The digital assets may be sent by a content provider **110**, be available from previous transactions or interfaces, be available from a generic library of digital assets such as ambient effects or stock images and environments, be interactive digital assets such as social media feeds or user-interactive elements, or any combination thereof.

At block **720**, the interface creator **130** may define virtual planes and layers for display of the digital assets. The virtual planes and layers may be defined based on a default configuration scheme, the number of digital assets received, or by a user. The virtual planes and layers may be the UI layer, title layer, foreground element layer, and panorama layer described above. The layers may have templates associated with them for automatic formatting and display of the digital assets.

At block **730**, the interface creator **130** may associate the digital assets with the defined virtual planes and layers, completing the user interface. Associating the digital assets with the virtual planes and layers may involve editing or degrading the digital assets in accordance with templates associated with the layers, including resizing, cropping, blurring, and adding gradients, as described above.

At block **740**, the completed user interface may be displayed, or output for display, to a user for interaction and may be aggregated with one or more user interfaces in the content aggregator **110** to create a catalogue of content for user selection and interaction. The user interface may be 2D or 3D and may have the ability to dynamically adapt dimensions to a user device to accessing the user interface. If the user interface is displayed in a 3D environment, a user may move through the environment and interact with the digital assets. If the user interface is created in a 3D environment and is being displayed in a 2D environment, the layers may flatten into fewer virtual planes, but may keep depth characteristics such as perspective and parallax effects.

FIG. **8** is a flow diagram depicting an example process for receiving and displaying a user interface with a user device, such as one of the user devices **170**. Although FIG. **8** is depicted as a sequence of blocks, the depicted sequence should not be construed as limiting the scope of the present disclosure. In various cases, aspects, and embodiments, the blocks and described operations may be altered, omitted, reordered, or performed in parallel. For purposes of illustration, reference is made to the network described in connection with FIG. **1**, although any suitable network and systems may be used to implement the described processing.

At block **810**, the user device may request content from a content aggregator, such as the content aggregator **140**. Such a request may be of any suitable form and may comprise a request for a content item, such as a movie or TV show. For example, a VR headset may request to watch a movie from a communicatively connected set top box. In another example, a smartphone may request to access a TV show via a web interface.

At block **820**, the user device may receive virtual planes, layers, and digital assets associated with the content item. Before being able to display, or output for display, a user interface such as those described herein, the user device may need to download or otherwise receive parts of the user interface. For example, after requesting to watch a movie, which has a user interface such as that seen in FIG. **2**, a VR headset may receive the title image **212**, the model **222**, layers **210**, **220**, **230**, and **240**, and virtual planes **250**, **260**, **270**, and **280**.

At block **830**, the user device may display, or output for display, the received layers with their associated digital assets on the associated virtual planes. For example, after receiving the user interface data of FIG. **2**, the VR headset may populate the layers with their digital assets and display the layers on their associated virtual planes. The VR headset may then display these layers to the user via an integrated display. These displayed layers comprise the user interface.

At block **840**, the user device may optionally interact with the displayed layers. After displaying the user interface to a user, the user may interact with the user interface, as described herein. For example, a VR headset may enable a user to view and manipulate digital assets in the displayed user interface. The VR headset may provide various perspectives of the user interface and may allow the user to select and view the content item associated with the user interface.

FIG. **9** depicts an example computing device in which various components described herein may be embodied, such as any of the various devices depicted in FIG. **1**. The computer architecture shown in FIG. **9** may correspond to a set-top box, remote control device, home automation system, desktop computer, laptop, tablet, network appliance, e-reader, smartphone, the content provider **110**, the interface creator **130**, the content aggregator **140**, the user devices **170**, or other computing device, and may be utilized to execute any aspects of the components described herein, such as to implement the operating procedures of FIG. **5**, **7**, or **8**, or aid in the creation of any of the user interfaces of FIGS. **2-4** and **6**.

A computing device **900** may include a baseboard, or "motherboard," which is a printed circuit board to which a multitude of components or devices may be connected by way of a system bus or other electrical communication paths. One or more central processing units ("CPUs") **04** may operate in conjunction with a chipset **06**. The CPU(s) **04** may be standard programmable processors that perform

arithmetic and logical operations necessary for the operation of the computing device **900**.

The CPU(s) **04** may perform the necessary operations by transitioning from one discrete physical state to the next through the manipulation of switching elements that differentiate between and change these states. Switching elements may generally include electronic circuits that maintain one of two binary states, such as flip-flops, and electronic circuits that provide an output state based on the logical combination of the states of one or more other switching elements, such as logic gates. These basic switching elements may be combined to create more complex logic circuits including registers, adders-subtractors, arithmetic logic units, floating-point units, and the like.

The CPU(s) **04** may, in various embodiments, be augmented with or replaced by other processing units, such as GPU(s) (not shown). GPU(s) may comprise processing units specialized for, but not necessarily limited to, highly parallel computations, such as graphics and other visualization-related processing.

A chipset **06** may provide an interface between the CPU(s) **04** and the remainder of the components and devices on the baseboard. The chipset **06** may provide an interface to a random access memory ("RAM") **08** used as the main memory in the computing device **900**. The chipset **06** may further provide an interface to a computer-readable storage medium, such as a read-only memory ("ROM") **20** or non-volatile RAM ("NVRAM") (not shown), for storing basic routines that may help to start up the computing device **900** and to transfer information between the various components and devices. The ROM **20** or NVRAM may also store other software components necessary for the operation of the computing device **900** in accordance with the aspects described herein.

The computing device **900** may operate in a networked environment using logical connections to remote computing nodes and computer systems through a local area network ("LAN") **16**. The chipset **06** may include functionality for providing network connectivity through a network interface controller (NIC) **22**, such as a gigabit Ethernet adapter. The NIC **22** may be capable of connecting the computing device **400** to other computing nodes over the network **16**. It should be appreciated that multiple NICs **22** may be present in the computing device **900**, connecting the computing device to other types of networks and remote computer systems.

The computing device **900** may be connected to a mass storage device **10** that provides non-volatile storage for the computing device **900**. The mass storage device **10** may store system programs, application programs, other program modules, and data, used to implement the processes and systems described in greater detail herein. The mass storage device **10** may be connected to computing device **900** through a storage controller **24** connected to the chipset **06**. The mass storage device **10** may consist of one or more physical storage units. A storage controller **24** may interface with the physical storage units through a serial attached SCSI ("SAS") interface, a serial advanced technology attachment ("SATA") interface, a fiber channel ("FC") interface, or other type of interface for physically connecting and transferring data between computers and physical storage units.

The computing device **900** may store data on the mass storage device **10** by transforming the physical state of the physical storage units to reflect the information being stored. The specific transformation of a physical state may depend on various factors and on different implementations of this description. Examples of such factors may include, but are not limited to, the technology used to implement the physical storage units and whether the mass storage device **10** is characterized as primary or secondary storage and the like.

For example, the computing device **900** may store information to the mass storage device **10** by issuing instructions through the storage controller **24** to alter the magnetic characteristics of a particular location within a magnetic disk drive unit, the reflective or refractive characteristics of a particular location in an optical storage unit, or the electrical characteristics of a particular capacitor, transistor, or other discrete component in a solid-state storage unit. Other transformations of physical media are possible without departing from the scope and spirit of the present description, with the foregoing examples provided only to facilitate this description. The computing device **900** may further read information from the mass storage device **10** by detecting the physical states or characteristics of one or more particular locations within the physical storage units.

In addition to the mass storage device **10** described above, the computing device **900** may have access to other computer-readable storage media to store and retrieve information, such as program modules, data structures, or other data. It should be appreciated by those skilled in the art that computer-readable storage media may be any available media that provides for the storage of non-transitory data and that may be accessed by the computing device **900**.

By way of example and not limitation, computer-readable storage media may include volatile and non-volatile, transitory computer-readable storage media and non-transitory computer-readable storage media, and removable and non-removable media implemented in any method or technology. Computer-readable storage media includes, but is not limited to, RAM, ROM, erasable programmable ROM ("EPROM"), electrically erasable programmable ROM ("EEPROM"), flash memory or other solid-state memory technology, compact disc ROM ("CD-ROM"), digital versatile disk ("DVD"), high definition DVD ("HD-DVD"), BLU-RAY, or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage, other magnetic storage devices, or any other medium that can be used to store the desired information in a non-transitory fashion.

The mass storage device **10** may store an operating system utilized to control the operation of the computing device **900**. For example, the operating system may comprise a version of the LINUX operating system. In another example, the operating system may comprise a version of the WINDOWS SERVER operating system from the MICROSOFT Corporation. According to further aspects, the operating system may comprise a version of the UNIX operating system. Various mobile phone operating systems, such as IOS and ANDROID, may also be utilized in some embodiments. It should be appreciated that other operating systems may also be utilized. The mass storage device **10** may store other system or application programs and data utilized by the computing device **900**.

The mass storage device **10** or other computer-readable storage media may also be encoded with computer-executable instructions, which, when loaded into the computing device **900**, transforms the computing device from a general-purpose computing system into a special-purpose computer capable of implementing the aspects described herein. These computer-executable instructions transform the computing device **900** by specifying how the CPU(s) **04** transition between states, as described above. The computing device **900** may have access to computer-readable storage media storing computer-executable instructions, which, when executed by the computing device **900**, may perform oper-

ating procedures depicted in FIG. **5**, **7**, or **8**, or aid in the creation of any of the user interfaces of FIGS. **2-4** and **6**.

The computing device **900** may also include an input/output controller **32** for receiving and processing input from a number of input devices, such as a keyboard, a mouse, a touchpad, a touch screen, an electronic stylus, or other type of input device. Similarly, the input/output controller **32** may provide output to a display, such as a computer monitor, a flat-panel display, a digital projector, a printer, a plotter, or other type of output device. It will be appreciated that the computing device **900** may not include all of the components shown in FIG. **9**, may include other components that are not explicitly shown in FIG. **9**, or may utilize an architecture completely different than that shown in FIG. **9**.

As described herein, a computing node may be a physical computing device, such as the computing device **900** of FIG. **9**. A computing node may also include a virtual machine host process and one or more virtual machine instances operating on a physical computing device, such as the computing device **900**. Computer-executable instructions may be executed by the physical hardware of a computing device indirectly through interpretation and/or execution of instructions stored and executed in the context of a virtual machine.

Applicant has described methods and systems for the creation of adaptive user interfaces that may be automatically created. It is to be understood that the methods and systems are not limited to specific methods, specific components, or to particular implementations. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting.

As used in the specification and the appended claims, the singular forms "a," "an," and "the" include plural referents unless the context clearly dictates otherwise. Ranges may be expressed herein as from "about" one particular value, and/or to "about" another particular value. When such a range is expressed, another embodiment includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent "about," it will be understood that the particular value forms another embodiment. It will be further understood that the endpoints of each of the ranges are significant both in relation to the other endpoint, and independently of the other endpoint.

"Optional" or "optionally" means that the subsequently described event or circumstance may or may not occur, and that the description includes instances where said event or circumstance occurs and instances where it does not.

Throughout the description and claims of this specification, the word "comprise" and variations of the word, such as "comprising" and "comprises," means "including but not limited to," and is not intended to exclude, for example, other components, integers or steps. "Exemplary" means "an example of" and is not intended to convey an indication of a preferred or ideal embodiment. "Such as" is not used in a restrictive sense, but for explanatory purposes.

Disclosed are components that can be used to perform the described methods and systems. These and other components are disclosed herein, and it is understood that when combinations, subsets, interactions, groups, etc., of these components are disclosed that while specific reference of each various individual and collective combinations and permutation of these may not be explicitly disclosed, each is specifically contemplated and described herein, for all methods and systems. This applies to all aspects of this application including, but not limited to, operations in disclosed methods. Thus, if there are a variety of additional operations that can be performed it is understood that each of these additional operations can be performed with any specific embodiment or combination of embodiments of the disclosed methods.

The present methods and systems may be understood more readily by reference to the aforementioned detailed description of preferred embodiments and the examples included therein and to the figures and their descriptions.

As will be appreciated by one skilled in the art, the methods and systems may take the form of an entirely hardware embodiment, an entirely software embodiment, or an embodiment combining software and hardware aspects. Furthermore, the methods and systems may take the form of a computer program product on a computer-readable storage medium having computer-executable program instructions (e.g., computer software) embodied in the storage medium. More particularly, the present methods and systems may take the form of web-implemented computer software. Any suitable computer-readable storage medium may be utilized including hard disks, CD-ROMs, optical storage devices, or magnetic storage devices.

Embodiments of the methods and systems are described above with reference to block diagrams and flowchart illustrations of methods, systems, apparatuses and computer program products. It will be understood that each block of the block diagrams and flowchart illustrations, and combinations of blocks in the block diagrams and flowchart illustrations, respectively, can be implemented by computer program instructions. These computer program instructions may be loaded on a general-purpose computer, special-purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions which execute on the computer or other programmable data processing apparatus create a means for implementing the functions specified in the flowchart block or blocks.

These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including computer-readable instructions for implementing the function specified in the flowchart block or blocks. The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer-implemented process such that the instructions that execute on the computer or other programmable apparatus provide steps for implementing the functions specified in the flowchart block or blocks.

The various features and processes described above may be used independently of one another, or may be combined in various ways. All possible combinations and sub-combinations are intended to fall within the scope of this disclosure. In addition, certain methods or process blocks may be omitted in some implementations. The methods and processes described herein are also not limited to any particular sequence, and the blocks or states relating thereto can be performed in other sequences that are appropriate. For example, described blocks or states may be performed in an order other than that specifically disclosed, or multiple blocks or states may be combined in a single block or state. The example blocks or states may be performed in serial, in parallel, or in some other manner. Blocks or states may be added to or removed from the disclosed example embodiments. The example systems and components described herein may be configured differently than described. For

example, elements may be added to, removed from, or rearranged compared to the disclosed example embodiments.

It will also be appreciated that various items are illustrated as being stored in memory or on storage while being used, and that these items or portions thereof may be transferred between memory and other storage devices for purposes of memory management and data integrity. Alternatively, in other embodiments, some or all of the software modules and/or systems may execute in memory on another device and communicate with the illustrated computing systems via inter-computer communication. Furthermore, in some embodiments, some or all of the systems and/or modules may be implemented or provided in other ways, such as at least partially in firmware and/or hardware, including, but not limited to, one or more application-specific integrated circuits ("ASICs"), standard integrated circuits, controllers (e.g., by executing appropriate instructions, and including microcontrollers and/or embedded controllers), field-programmable gate arrays ("FPGAs"), complex programmable logic devices ("CPLDs"), etc. Some or all of the modules, systems, and data structures may also be stored (e.g., as software instructions or structured data) on a computer-readable medium, such as a hard disk, a memory, a network, or a portable media article to be read by an appropriate device or via an appropriate connection. The systems, modules, and data structures may also be transmitted as generated data signals (e.g., as part of a carrier wave or other analog or digital propagated signal) on a variety of computer-readable transmission media, including wireless-based and wired/cable-based media, and may take a variety of forms (e.g., as part of a single or multiplexed analog signal, or as multiple discrete digital packets or frames). Such computer program products may also take other forms in other embodiments. Accordingly, the disclosed embodiments may be practiced with other computer system configurations.

While the methods and systems have been described in connection with preferred embodiments and specific examples, it is not intended that the scope be limited to the particular embodiments set forth, as the embodiments herein are intended in all respects to be illustrative rather than restrictive.

Unless otherwise expressly stated, it is in no way intended that any method set forth herein be construed as requiring that its operations be performed in a specific order. Accordingly, where a method claim does not actually recite an order to be followed by its operations or it is not otherwise specifically stated in the claims or descriptions that the operations are to be limited to a specific order, it is no way intended that an order be inferred, in any respect. This holds for any possible non-express basis for interpretation, including: matters of logic with respect to arrangement of steps or operational flow; plain meaning derived from grammatical organization or punctuation; and the number or type of embodiments described in the specification.

It will be apparent to those skilled in the art that various modifications and variations can be made without departing from the scope or spirit of the present disclosure. Other embodiments will be apparent to those skilled in the art from consideration of the specification and practices described. It is intended that the specification and example figures be considered as exemplary only, with a true scope and spirit being indicated by the following claims.

What is claimed:

1. A method comprising:

receiving at least a first digital asset and a second digital asset, each of the at least first digital asset and second digital asset being associated with a content item;

determining at least a first virtual plane associated with the first digital asset and a second virtual plane associated with the second digital asset, wherein the first virtual plane is associated with a first depth and a first template, and wherein the second virtual plane is associated with a second depth and a second template;

determining a first modified size of the first digital asset to fit within the first template and a second modified size of the second digital asset to fit within the second template, wherein the first modified size is different from the second modified size; and

outputting a user interface comprising the first digital asset output in the first modified size in the first virtual plane and the second digital asset output in the second modified size in the second virtual plane.

2. The method of claim **1**, further comprising:

degrading the first digital asset to disguise distortion associated with the first digital asset.

3. The method of claim **1**, wherein the first template comprises attributes to facilitate automated formatting of the first digital asset.

4. The method of claim **1**, further comprising adding a gradient to a top of the first digital asset, a bottom of the first digital asset, or both.

5. The method of claim **1**, further comprising:

adding a gradient to the first digital asset, wherein one or more colors of the gradient are determined by one or more colors of the first digital asset and a background.

6. The method of claim **1**, wherein the second virtual plane is positioned in front of the first virtual plane.

7. The method of claim **1**, further comprising:

determining whether the first modified size of the first digital asset or the second modified size of the second digital asset is distorted.

8. The method of claim **1**, wherein the first template comprises one or more bounds for a size of the first digital asset.

9. The method of claim **1**, wherein at least one of the first digital asset and second digital asset comprise at least one of: a name of the content item; an image of the content item; a three-dimensional virtual object representing an object of the content item; a snippet of video of the content item; cover art identifying the content item; a poster identifying the content item; one or more social media feeds about the content item; an interactive element for manipulation of the content item; a description of the content item; and a relation to a subject of the content item.

10. A method comprising:

receiving a plurality of digital assets, the digital assets being related to a content item;

receiving interface data comprising a plurality of layers, each of the plurality of layers having a respective digital asset template and a respective depth;

assigning the digital assets to the plurality of layers, wherein each assigned layer may be assigned one or more digital assets;

formatting the digital assets in accordance with the respective digital asset templates of the assigned layers;

populating the assigned layers with the formatted digital assets;

determining a first modified size of a first digital asset of the formatted digital assets to fit within a first digital

asset template of the digital asset templates and a second modified size of a second digital asset of the formatted digital assets to fit within a second digital asset template of the digital asset templates, wherein the first modified size is different from the second modified size; and

outputting a user interface comprising the formatted digital assets comprising the first digital asset output in the first modified size in a first virtual plane and the second digital asset output in the second modified size in a second virtual plane.

11. The method of claim **10**, further comprising:

receiving a request to display another user interface associated with the content item, the request including a two-dimensional environment for display; and

outputting for display the plurality of layers in the requested two-dimensional environment according to the respective depth of each layer.

12. The method of claim **10**, further comprising:

receiving a request to display another user interface associated with the content item, the request including a three-dimensional environment for display; and

outputting for display the plurality of layers in the requested three-dimensional environment according to the respective depth of each layer.

13. The method of claim **12**, wherein the three-dimensional environment is a virtual reality environment.

14. The method of claim **10**, wherein the formatting comprises at least one of:

cropping, resizing, blurring, adding a gradient, or any combination thereof.

15. A system comprising:

one or more processors;

a non-transitory, computer-readable storage medium configured to communicate with at least one processor of the one or more processors, wherein the computer-readable storage medium comprises one or more programming instructions that, when executed, cause the processor to:

receive at least a first digital asset and a second digital asset, each of the at least first digital asset and second digital asset being associated with a content item;

determine at least a first virtual plane associated with the first digital asset and a second virtual plane associated with the second digital asset, wherein the first virtual plane is associated with a first depth and a first template, and wherein the second virtual plane is associated with a second depth and a second template;

determine a first modified size of the first digital asset to fit within the first template and a second modified size of the second digital asset to fit within the second template, wherein the first modified size is different from the second modified size; and

output a user interface comprising the first digital asset output in the first modified size in the first virtual plane and the second digital asset output in the second modified size in the second virtual plane.

16. The system of claim **15**, wherein the instructions, when executed, further cause the at least one processor to:

degrade the first digital asset to disguise distortion associated with the first digital asset.

17. The system of claim **15**, wherein the first template comprises attributes to facilitate automated formatting of the first digital asset.

18. The system of claim **15**, wherein the instructions, when executed, further cause the at least one processor to add a gradient to a top of the first digital asset, a bottom of the first digital asset, or both.

19. The system of claim **15**, wherein the instructions, when executed, further cause the at least one processor to:

add a gradient to the first digital asset, wherein one or more colors of the gradient are determined by one or more colors of the first digital asset and a background.

20. The system of claim **15**, wherein the second virtual plane is positioned in front of the first virtual plane.

21. The system of claim **15**, wherein the instructions, when executed, further cause the at least one processor to:

determine whether the first modified size of the first digital asset or the second modified size of the second digital asset is distorted.

22. The system of claim **15**, wherein the first template comprises one or more bounds for a size of the first digital asset.

23. The system of claim **15**, wherein at least one of the first digital asset and second digital asset comprise at least one of: a name of the content item; an image of the content item; a three-dimensional virtual object representing an object of the content item; a snippet of video of the content item; cover art identifying the content item; a poster identifying the content item; one or more social media feeds about the content item; an interactive element for manipulation of the content item; a description of the content item; and a relation to a subject of the content item.

24. A system comprising:

one or more processors;

a non-transitory, computer-readable storage medium configured to communicate with at least one processor of the one or more processors, wherein the computer-readable storage medium comprises one or more programming instructions that, when executed, cause the processor to:

receive a plurality of digital assets, the digital assets being related to a content item;

receive interface data comprising a plurality of layers, each of the plurality of layers having a respective digital asset template and a respective depth;

assign the digital assets to the plurality of layers, wherein each assigned layer may be assigned one or more digital assets;

format the digital assets in accordance with the respective digital asset templates of the assigned layers;

populate the assigned layers with the formatted digital assets;

determine a first modified size of a first digital asset of the formatted digital assets to fit within a first digital asset template of the digital asset templates and a second modified size of a second digital asset of the formatted digital assets to fit within a second digital asset template of the digital asset templates, wherein the first modified size is different from the second modified size; and

output a user interface comprising the formatted digital assets comprising the first digital asset output in the first modified size in a first virtual plane and the second digital asset output in the second modified size in a second virtual plane.

25. The system of claim **24**, wherein the instructions, when executed, further cause the at least one processor to:

receive a request to display another user interface associated with the content item, the request including a two-dimensional environment for display; and

output for display the plurality of layers in the requested two-dimensional environment according to the respective depth of each layer.

26. The system of claim **24**, wherein the instructions, when executed, further cause the at least one processor to:

receive a request to display another user interface associated with the content item, the request including a three-dimensional environment for display; and

output for display the plurality of layers in the requested three-dimensional environment according to the respective depth of each layer.

27. The system of claim **26**, wherein the three-dimensional environment is a virtual reality environment.

28. The system of claim **24**, wherein the formatting comprises at least one of: cropping, resizing, blurring, adding a gradient, or any combination thereof.

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